

CLAIMS

What is claimed is:

1. An electronic device, comprising:  
a protective housing;  
5 a light source disposed within the protective housing; and  
a cover secured to the protective housing to form a protective enclosure for the electronic device and to form a light guide for guiding a first portion of light from the light source to a first surface portion of the cover, a second surface portion of the cover being adapted to totally internally reflect the first portion of the light to the first surface portion.  
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2. The electronic device as recited in claim 1, wherein the cover is adapted to refract the first portion of the light through the first surface portion of the cover.
3. The electronic device as recited in claim 1, wherein the first surface portion comprises an inverted pyramid portion extending from a third surface portion of the cover.  
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4. The electronic device as recited in claim 1, further comprising a plurality of first surface portions extending from a third surface portion of the cover, wherein each of the first surface portions extends a different distance from the third surface portion.  
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5. The electronic device as recited in claim 1, wherein the cover is adapted to refract a second portion of light from the light source through the second surface portion.
6. The electronic device as recited in claim 5, wherein the cover has a third  
25 surface portion, the cover being adapted to totally internally reflect the first and second portions of light to the second surface portion of the cover.
7. The electronic device as recited in claim 1, wherein the cover comprises a  
30 molded polymeric material.

8. The electronic device as recited in claim 7, wherein the polymeric material comprises Trogamid®.

5 9. The electronic device as recited in claim 1, wherein the electronic device receives power via a cable inserted into the protective housing, the cover having a guide portion adapted to guide the cable to a desired position and to secure the cable between the protective housing and the cover as the cover is secured to the protective housing.

10 10. The electronic device as recited in claim 9, wherein the guide portion is configured with a first serrated surface and a corresponding portion of the protective housing is configured with a second serrated surface, the first and second serrated surfaces being adapted for engagement when the cover is disposed on the protective housing.

11 11. The electronic device as recited in claim 1, wherein the first surface portion is angled with respect to a direction of propagation of light through the cover.

12 12. The electronic device as recited in claim 1, wherein the first surface portion comprises a plurality of surfaces angled with respect to a direction of propagation of light through the cover, wherein light is refracted through the first surface portion at a plurality of angles with respect to the direction of propagation of light through the cover.

13. The electronic device as recited in claim 1, the cover further comprising a light-receiving portion extending to a position adjacent to the light source.

25 14. The electronic device as recited in claim 5, wherein the third surface portion has an angle of approximately 25 degrees with respect to an interior surface of the cover.

15. The electronic device as recited in claim 1, wherein the light source is a light emitting diode (LED).

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16. The electronic device as recited in claim 1, wherein the cover comprises a material having an index of refraction of approximately 1.566 at a wavelength of 589.3 nm.

17. The electronic device as recited in claim 1, wherein the light source provides light in a plurality of colors.

18. The electronic device as recited in claim 1, wherein the cover is adapted to totally internally reflect light from the light source in a plurality of colors.

19. A protective cover for an enclosure, comprising:  
a first surface region of the cover, the first surface region being oriented on a first side of the enclosure;  
a second surface region of the cover, the second surface region being oriented on a second side of the enclosure; and  
a first portion of the cover, the first portion being adapted to receive light from a light source and totally internally reflect the light to the first surface region and the second surface region.

20. The cover as recited in claim 19, wherein a first portion of the light is totally internally reflected at the first surface region to the second surface region through the first portion of the cover.

21. The cover as recited in claim 20, wherein a second portion of the light is refracted at the first surface.

22. The cover as recited in claim 19, wherein the first portion comprises an angled member extending from a third surface region of the cover.

23. The cover as recited in claim 19, wherein the first side of the enclosure is transverse to the second side of the enclosure.

24. The cover as recited in claim 19, wherein the first side is opposite of the second side.

5 25. The cover as recited in claim 19, wherein the first surface region is adapted to refract the light from the light source in a plurality of directions.

26. The cover as recited in claim 25, wherein the first surface region is adapted with a plurality of angled surface faces.

10 27. The cover as recited in claim 19, wherein the first surface region comprises a smooth strip portion of the first surface region.

15 28. The cover as recited in claim 19, wherein the first surface region comprises an inverted pyramid portion extending from the first side of the enclosure.

20 29. The cover as recited in claim 19, further comprising a plurality of inverted pyramid portions extending from the first side of the enclosure, wherein a first inverted pyramid portion extends further from the first side of the enclosure than a second inverted pyramid portion.

30. The cover as recited in claim 19, wherein the enclosure receives a cable, the cover having a guide portion adapted to guide the cable to a desired position within the enclosure and to secure the cable between cover and a portion of the enclosure.

25 31. The cover as recited in claim 30, wherein the guide portion is configured with a first serrated surface and a corresponding portion of the protective housing is configured with a second serrated surface, the first and second serrated surfaces being adapted for engagement when the cover is disposed on the protective housing.

32. The cover as recited in claim 19, wherein the cover is adapted to totally internally reflect a plurality of colors of light from the light source.

33. A cover for an electronic device, comprising:

5 a first portion adapted to cooperate with a protective housing to form a protective enclosure for the electronic device, the first portion having first and second exterior surface portions oriented at an angle to each other; and

10 a second portion adapted to extend from the first portion to a position adjacent to a light source within the enclosure, wherein light from the light source is internally reflected through the second portion to the first and second exterior surfaces, further wherein the light from the light source is refracted at the first and second exterior surfaces.

15 34. The cover as recited in claim 33, wherein a portion of the light is totally internally reflected at the first exterior surface portion.

35. The cover as recited in claim 34, wherein the portion of light that is totally internally reflected at the first exterior surface is internally reflected to the second exterior surface portion.

20 36. The cover as recited in claim 33, wherein one of the first and second exterior surface portions is adapted to refract the light from the light source in a plurality of directions.

25 37. The cover as recited in claim 33, wherein one of the first and second exterior surface portions is adapted to produce a plane of refracted light.

30 38. The cover as recited in claim 33, wherein the electronic device receives a cable, the cover having a guide portion adapted to guide the cable to a desired position and to secure the cable between the protective housing and the cover as the cover is secured to the protective housing.

39. The cover as recited in claim 33, wherein the guide portion is configured with a first serrated surface and a corresponding portion of the protective housing is configured with a second serrated surface, the first and second serrated surfaces being adapted for engagement when the cover is disposed on the protective housing.

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40. A method of providing visual information from an electronic device, comprising the acts of:

producing light from a light source housed within a protective enclosure of the electronic device, the light providing data from the electronic device; and

10 adapting the electronic device to guide the light from the light source to a plurality of surface portions of the enclosure using total internal reflection to guide the light through a portion of a cover of the enclosure and to refract the light at the plurality of surface portions so that the light is visible from a plurality of sides of the enclosure.

15 41. The method as recited in claim 40, further comprising the act of providing each of a plurality of light sources housed within the electronic device with a unique color.

42. The method as recited in claim 40, wherein adapting comprises refracting light in a different pattern at each of the plurality of surface portions.

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43. The method as recited in claim 40, wherein adapting comprises molding the cover.

25 44. A method of manufacturing a cover for an electronic device, comprising the acts of:

identifying a moldable material's critical angle for total internal reflection of light from a light source to be housed within the device;

designing a shape for the cover to use total internal reflection to direct light from the light source to a surface portion of the cover; and

30 molding the cover to the shape.

45. The method as recited in claim 44, wherein designing comprises designing the shape of the cover to refract the light at the surface portion so that the light is visible from a plurality of sides of the device.

5 46. The method as recited in claim 44, wherein molding comprises molding the cover of a transparent material.

47. The method as recited in claim 44, wherein molding comprises polishing portions of a mold used in molding the cover, the portion of the mold corresponding to surfaces of the cover used to totally internally reflect light from the light source.

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48. The method as recited in claim 44, wherein designing comprises configuring the shape of the cover with a first portion that extends to a position adjacent to the light source to receive light from the light source.

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49. The method as recited in claim 48, wherein designing comprises configuring the first portion with a curved surface to minimize reflection of light from the light source.

50. The method as recited in claim 49, wherein designing comprises configuring the first portion to taper from a wider portion adjacent to the light source to a narrower portion adjacent to the surface portion of the cover.

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